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LABORATORY

LLNL-TR-655437

# **Level-2 Milestone 4795: CTS-1 Market Survey Completed**

**Milestone Report for NNSA HQ**

*Prepared by Matt Leininger  
May 29, 2014*

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# Introduction

This report documents the fact that the CTS1 market survey has been completed. The description of the milestone is:

*A market survey will be conducted to understand the current state of the art in commodity computing cluster options.*

The milestone completion criterion is:

*Market survey including results of studying technologies available from potential vendors in order to inform the CTS1 RFP.*

The milestone was completed on May 29<sup>th</sup> 2014 and the survey information incorporated into the DRAFT CTS1 RFP.

## CTS1 Market Survey Description

The CTS1 market survey process started in October 2013 with several multi-way Non-Disclosure Agreements being signed that would allow the Tri-Labs and vendor to discuss information critical to CTS1. Most of the NDAs were in place by January 2014, and the CTS1 market survey kicked off on Feb. 5-7<sup>th</sup>. The CTS1 technical team met with 14 vendors including component vendors and system integrators including: AMD, Mellanox, Dell, Penguin, SGI, Cray, Asetek, HP, IBM, Hyve Solutions, Intel, Clustered Systems, Nvidia, and Applied Micro. Follow up meetings have occurred with many of these vendors and the technology information is being incorporated into the CTS1 RFP.

## CTS1 Market Survey Summary

The CTS1 market survey provided key information on potential CTS1 technologies including cluster networks, processors, memory, and cooling options. There are several survey findings that impact the RFP. First, the CTS1 high-speed network is the most likely high-risk technology. Several next generation networking technologies may be available from multiple vendors, however the current general availability (GA) dates of these networking technologies is early 2HCY2015. These GA dates add schedule and technology risks for the network. To provide the Tri-Labs with the most flexibility and to help reduce the technology and schedule risk of the network, the CTS1 RFP has been updated to include an architecture decision point milestone. This milestone allows potential bidders to provide two high-speed networks options, one higher risk and the second lower risk, with the Tri-Labs selecting which path best meets our needs. This gives the CTS1 technical team and CTS1 vendor an additional 8-9 months to evaluate the two options for the CTS1 high-speed network.

Second, the CTS1 processor and motherboard options are relatively low risk, with the exception of ARM based solutions. The most viable processors for CTS1 will have been GA a full nine months or more before the first CTS1 deliveries, providing ample time for testing and evaluations of the potential CTS1 hardware and related software. Third, the CTS1 system will be able to meet and likely exceed our 2GB/core memory requirement with high-speed DDR3 or DDR4 memory. Fourth, many vendors have options for both air and liquid cooling. It's very likely that some liquid cooled CTS1 solutions will be deployed at the Tri-Labs. The CTS1 RFP is being updated with requirements for liquid and air cooling, while continuing to leverage the same hardware base across all CTS1 systems. The CTS1 RFP will also include options for GPU enabled nodes and adding SSDs to all nodes.

An example CTS1 Scalable Unit (SU) may have 162 nodes, a total of 175-250 TF/s, 20 TB memory capacity (with options for 10 or 40 TB), 20+ TB/s memory bandwidth, and include over 5,000 cores.

A more detailed CTS1 market survey summary presentation, that includes NDA information, is available on request.

## Attachment 1: Milestone Definition Text

<b>Milestone (ID#4795): CTS-1 Market Survey Completed</b>		
<b>Level: 2</b>	<b>Fiscal Year: FY14</b>	<b>DOE Area/Campaign: ASC</b>
<b>Completion Date: 6/30/14</b>		
<b>ASC nWBS Subprogram: CSSE</b>		
<b>Participating Sites: LLNL</b>		
<b>Participating Programs/Campaigns: ASC</b>		
<b>Description: A market survey will be conducted to understand the current state of the art in commodity computing cluster options.</b>		
<b>Completion Criteria: Market survey including results of studying technologies available from potential vendors in order to inform the CTS-1 RFP</b>		
<b>Customer: ASC</b>		
<b>Milestone Certification Method: Professional report and hand-off to ASC program</b>		
<b>Supporting Resources: CSSE tri-lab personnel</b>		

## Attachment 2: Handoff Letter



Lawrence Livermore National Laboratory

May 29, 2014

Memorandum

To: Michel McCoy, ASC Program Leader

From: Matt Leininger

Subject: Completion of LLNL L2 Milestone 4795

I certify that the LLNL ASC Level 2 Milestone 4795 "CTS-1 Market Survey Completed" was completed on May 29, 2014.

The CTS1 market survey process started in October 2013 with several multi-way NDA's being signed that would allow the Tri-Labs and vendor to discuss information critical to CTS1. Most of the NDAs were in place by January 2014, and the CTS1 market survey kicked off on Feb. 5-7th. The CTS1 technical team met with 14 vendors including component vendors and system integrators including: AMD, Mellanox, Dell, Penguin, SGI, Cray, Asetek, HP, IBM, Hyve Solutions, Intel, Clustered Systems, Nvidia, and Applied Micro. Follow up meetings have occurred with many of these vendors and the technology information is being incorporated into the CTS1 RFP thereby satisfying the requirement of the L2 milestone.

The details of the efforts required to meet this milestone are documented in "Level-2 Milestone 4795: CTS-1 Market Survey Completed" (May 29, 2014).

A handwritten signature in black ink, appearing to read "Matt Leininger".

Matt Leininger  
Deputy for Advanced Technology Projects  
Advanced Technology Office, Livermore Computing  
Integrated Computing & Communications Department

Cc: File

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